Level 1	STEMI PTs w/angiogram, N=2062		
Death	w/CTO N=297	w/o CTO N=1765	p-value
In-Hospital Death, N (%)	39 (13.1)	63 (3.6)	<0.0001
Death in 30 days, N (%)	45 (15.2)	75 (4.3)	<0.0001
Death in 1 year, N (%)	65 (21.9)	133 (7.5)	<0.0001

Level 2	NSTEACS PTs w/angiogram, N=827		
Death	w/CTO N=203	w/o CTO N=624	p-value
In-Hospital Death, N (%)	11 (5.4)	10 (1.6)	0.0027
Death in 30 days, N (%)	14 (6.9)	13 (2.1)	0.0008
Death in 1 year, N (%)*	11 (9.5)	25 (6.4)	0.2647

*N=504 for 1 year (excluding 2012)

Conclusions: Our data demonstrates that PTs with STEMI and a CTO have higher in-hospital, 30 day, and one year mortalities than STEMI PTs without a CTO. PTs with NSTEACS and a CTO have higher in-hospital and 30 day mortality than NSTEACS PTs without a CTO, and there is a non-significant trend towards increased one year mortality for PTs with a CTO. Strategies to reduce this increased mortality are needed.

TCT-371

Impact of Chronic Total Occlusions on Mortality in Patients Presenting With Cardiac Arrest

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Background: Cardiac arrest (CA) is often the result of both acute and chronic coronary artery disease (CAD) particularly when it is caused by ventricular tachycardia or fibrillation (VT/VF). Therapeutic hypothermia has been shown to decrease mortality and after resuscitated CA (rCA). It has been demonstrated that a chronic total occlusion (CTO) in the non-infarct artery in patients (Pts) with ST segment elevation myocardial infarction (STEMI) is associated with increased mortality. The incidence and effect of CTOs in Pts with rCA has not been well described. Further the incidence and effect of CTOs in rCA Pts as the result of STEMI is unknown.
Methods: The Minneapolis Heart Institute has developed formalized protocols for both STEMI (Level One, L1) and cardiac arrest and sequential therapeutic hypothermia (Cool-It). From 2006-May 2012, 164 sequential Pts who had been enrolled in the Cool-It program who presented with VT/VF and underwent angiography were evaluated for the presence of at least one CTO in a major coronary vessel. From 2006-May 2012, 121 PTs who had been enrolled in the Cool-It program and underwent angiography but also suffered from STEMI were also evaluated for CTOs. In-hospital, 30 day, and 1 year mortality were compared between Pts who did and did not have CTO. STEMI Pts who presented with rCA were compared to STEMI Pts without rCA for the presence of a CTO.
Results: See table below:

Cool-It Pts w/angiogram and VT/VF, N=164			
Death	w/CTO N=37	w/o CTO N=127	p-value
In-Hospital Death, N (%)	15 (40.5)	37 (29.1)	0.1895
Death in 30 days, N (%)	16 (43.2)	40 (31.5)	0.1848
Death in 1 year, N (%)	17 (46.0)	43 (33.9)	0.1792
Cool-It Pts w/angiogram and STEMI, N=121			
Death	w/CTO N=30	w/o CTO N=91	p-value
In-Hospital Death, N (%)	16 (53.3)	33 (36.3)	0.0986
Death in 30 days, N (%)	15 (50)	35 (38.5)	0.2657
Death in 1 year, N (%)	17 (56.7)	37 (40.7)	0.1261
STEMI Pts from 2007-2011, N=2062			
	w/rCA	w/o rCA	p-value
w/CTO, N (% for column)	22 (24.7)	275 (13.9)	0.0046
w/o CTO, N (% for column)	67 (75.3)	1698 (86.1)	

Conclusions: These data demonstrate that rCA Pts presenting with VT/VF and who have a CTO appear to have similar mortality compared to those without a CTO. Pts with and without a CTO who presented with rCA and STEMI have similar mortality although there is a trend in favor of those without a CTO. STEMI Pts with rCA have a higher incidence of a CTO than do STEMI Pts without rCA. Further efforts to understand, treat, and avoid CA in Pts with a CTO are warranted.

TCT-372

"Full metal jacket" (stented length > or = 50 mm) using drug-eluting stents for chronic total occlusive lesions.

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Background: Limited data exists on patients who have undergone drug eluting stent (DES) implantation of long chronic total occlusive (CTO) lesion in native coronary arteries.
Methods: We defined long continuous stent implantation (stent length > or = 50 mm) as "full metal jacket" (FMJ). From April 2007 to March 2013, 344 consecutive patients (361 lesions) who underwent FMJ using any DESs for de novo lesion were enrolled. Subjects were classified into two groups: the patients with CTO lesion (CTO group, 113 patients, 114 lesions) and without CTO lesion (non-CTO group, 239 patients, 247 lesions). The two groups were compared for mean 24±19 months clinical outcomes. Endpoints were freedom from target lesion revascularization (TLR) and major adverse cardiovascular events (MACE) defined as composite of TLR, myocardial infarction and all cause death at 5 years after percutaneous coronary intervention procedure. This was a single center non-randomized retrospective study.
Results: CTO group was younger than non-CTO group (66.0±0.9 vs. 70.0±0.6, p<0.05). The percentage of male gender and hyperlipidemia were higher in CTO group than non-CTO group (84.2% vs. 69.6%, p<0.05 and 58.8% vs. 47.0%, p<0.05, respectively). There were no significant differences between both study arms in percentages of diabetes mellitus (43.0% vs. 48.6%, p=0.32), hypertension (71.9% vs. 75.2%, p=0.51), hemodialysis (2.6% vs. 5.3%, p=0.26) and current smoker (19.3% vs. 17.1%). Target vessel was more often the right coronary artery in CTO group than non-CTO group (71.1% vs. 33.2%, p<0.05). The mean total length of implanted stents was longer in CTO group than non-CTO group (72.8±1.4 mm vs. 60.9±0.9 mm, p<0.05). Intravascular ultrasound was used in 70.0% and follow up rate of angiography was 75.9%. Regarding the long-term clinical outcomes, there were no significant differences in the rate of freedom from TLR (60.5±10.5% vs. 76.9±4.7%, Log rank p=0.48) and MACE (53.8±9.9% vs. 67.2±4.8%, Log rank p=0.88) at 5 years estimated using the Kaplan-Meier methods compared to non-CTO group.
Conclusions: The strategy of FMJ using DES was acceptable for CTO lesions.

TCT-373

Decreasing R-wave Amplitude During Percutaneous Coronary Intervention for Chronic Total Occlusion in the Retrograde Approach

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Background: The use of retrograde approach for recanalization of chronic total occlusion (CTO) has been established with improved success rates. During the procedure of percutaneous coronary intervention (PCI) for CTO lesions in the retrograde approach, electrocardiographic R-wave amplitudes often decrease in many leads. Because the differential diagnoses of low voltages on electrocardiogram (ECG) include pericardial effusion, the presence of these changes should increase the index of suspicion for a significant pericardial effusion due to coronary perforation and prompt further evaluation such as echocardiography.
Methods: We analyzed the recent 30 patients (group-R, age 65±12) who underwent successful PCI for CTO lesions in the retrograde approach and the recent 30 patients (group-E, age 60±10) who underwent treatment for pericardial effusion during catheter intervention. Group-E was divided into 2 groups according to whether requiring drainage of effusion [group-E/D(+) ,n=15] or not [group E/D(-), n=15]. Pre-ECG was defined as the ECG just before the catheter intervention. Post-ECG was defined as the ECG just before the procedure of drainage for Group-E/D(+) and the ECG immediately after catheter intervention for other groups.
Results: In comparison of pre-ECG and post-ECG, the leads in which R-wave amplitude significantly decreased were I, II, aVL, V1,V4, V5, and V6 in group-R; I, II, aVL,V4, V5, and V6 in group-E/D(+); but only aVL in group-E/D(-). Heart rate (HR) significantly increased in group-E /D(+) (64±12 to 83±18, p=0.0034) between the 2 ECGs, but not in group-R and group-E/D(-). Comparing group-R and group-E/D(+), the rate of R-wave amplitude between the 2 ECGs [(R-wave amplitude in post-ECG)/(R-wave amplitude in pre-ECG)] was similar in all leads. But the rate of HR between the 2 ECGs [(HR in post-ECG) / (HR in pre-ECG)] was higher in group-E/D(+) (0.96±0.34 vs 1.32±0.29, p=0.0024). Comparing group-R and group-E/D(-), the rate of HR between the 2 ECGs was similar. But the rate of R-wave amplitudes between the 2 ECGs of group-R was significantly lower in leads I(0.66±0.25 vs 0.99±0.58, p=0.0074), II(0.88±0.33 vs 1.20±0.41, p=0.014), V1(0.72±0.29 vs 1.11±0.55, p=0.0019), and V5(0.67±0.31 vs 0.95±0.30, p=0.0042).
Conclusions: During the procedure of PCI for CTO lesions in the retrograde approach, ECG shows decreasing R-wave amplitudes similarly with the case of pericardial effusion requiring drainage during catheter intervention. However, by taking HR into account, decreasing R-wave amplitude during PCI for CTO lesions in the retrograde approach could be discriminated from ECG changes due to pericardial effusion during catheter intervention.

TCT-374

Results of the ALSTER CTO-OCT registry: Delayed DES endothelialization after subintimal recanalization of chronic of total occlusion: Observation by optical coherence tomography

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POSTERS

Background: Successful CTO treatment is able to increase left ventricular function, exercise capacity and reduction of mortality. Up to date no adequate information on stent strut endothelialisation after CTO treatment is available. In particular, the duration of dual antiplatelet therapy (DAPT) remains an issue of debate. Following CTO treatment, patients are at risk for restenosis as well as stent thrombosis. DAPT is able to sufficient reduce frequency of stent thrombosis, but keeps an increased risk of major bleeding in case of unnecessarily prolonged ingestion. Intracoronary optical coherence tomography (OCT) is a novel invasive method, which is able to precisely analyse stent strut endothelialisation. We tested the hypothesis, that OCT detects delayed endothelialisation after CTO treatment compared to non-CTO PCI.
Methods: We performed diagnostic OCT measurements following successful CTO treatment (n = 22) as well as non-CTO DES PCI of complex lesions (n = 29). All Patients had been treated with 2nd generation DES. Mean time point of OCT analysis was 7.8 months and 6.5 months, respectively (p = 0.83).
Results: The two groups were well matched and similar concerning characteristics. Stent struts (in total n = 13629) were analysed and classified by OCT according to previously described methods (CTO recanalization vs. non-CTO DES; mean +/- SEM): covered struts: 81.65 +/- 2.9% vs. 97.34 +/- 0.78%, p<0.0001; protruding/uncovered struts: 10.1 +/- 1.7% vs. 1.4 +/- 0.4%, p<0.0001; malapposed/uncovered struts: 7.9 +/- 2.0 % vs. 1.3 +/- 0.5 %, p<0.001. We performed subgroup analysis concerning CTO recanalization by antegrade vs. retrograde approach as well as subintimal tracking vs. non-subintimal tracking methods. No significant differences were found concerning subgroup analysis. No MACE events were detected in this series.
Conclusions: Here we describe delayed stent endothelialisation after CTO treatment. Our results suggest an urgent need to extend the DAPT after CTO treatment to reduce the risk of late stent thrombosis. OCT allows interventional cardiologists to safe and precisely perform follow-up examinations in patients after CTO recanalization with the ability of individualise the duration of DAPT.

TCT-375

Comparison of Long Term Outcome After First- and Second-Generation Drug-Eluting Stents in the Treatment of Chronic Total Occlusions: Insights From a Large Registry of 1,343 Consecutive Patients

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Background: Second-generation drug-eluting stents (DES) have reduced the occurrence of target vessel revascularisation (TVR) and stent thrombosis compared to first-generation DES but the clinical impact in chronic total occlusion (CTO) is poorly described. We aimed to compare long-term outcome after 1st and 2nd-generation DES in patients with CTO.
Methods: Of 1,343 consecutive Patients who underwent PCI for CTO between 2004 and 2012, long term outcome was evaluated after successful DES implantation. Major adverse cardiac events (MACE) including cardiac death, target vessel revascularisation (TVR) and myocardial infarction (MI) were compared between patients treated with 1st (sirolimus and paclitaxel) and 2nd -generation DES (everolimus, zotarolimus and biolimus).
Results: Procedural success was achieved in 1000 (74.4 %) patients of which 943 (70.2%) received at least one stent. DES were implanted in 873 patients (65%) who defined the study population.Patients treated with 1st generation DES (583 patients, 66.9% of the whole population) had a higher rate of current smoking (28% vs. 20% p=0.007), were more frequently treated for left anterior descending CTO (37% vs. 29% p=0.018) and had shorter stent length (46 ± 25 vs. 51 ± 25 mm, p=) compared to patients treated by 2nd generation DES. Age, gender, diabetes, and LVEF were similar between groups. Median follow-up was at 4.1 years (IQR: 2.4-6.5 years). Patients treated 2nd generation DES had lower MACE rate compared to 1st-generation DES (12.7% vs. 21.3%, respectively, p=0.003). The decrease in MACE rate was driven by lower TVR (8.7%, vs. 13.4%, respectively p=0.04) whereas cardiac death and MI were similar between groups (p=0.32 and p=0.15, respectively). Cumulative event rates by Kaplan-Meier analysis showed lower incidence of TVR among patients treated by 2nd generation stent (p Log Rank =0.02).
Conclusions: In patients successfully treated by PCI for CTO, 2nd generation DES are associated with better long-term clinical outcome, when compared to 1st generation DES. This is mainly driven by lower TVR rates

TCT-376

Is Cardiac Tamponade Associated With Adverse Outcome in Patients Treated by PCI for Chronic Total Coronary Occlusion. An Insight From a Large French Registry Including More than 1,500 Patients.

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Background: PCI of chronic total occlusion (CTO) has become more and more aggressive during the last decade, especially because of frequent use of hydrophilic, hard and stiff wires, which have increased the rate of success. Indeed, the incidence and clinical consequences of cardiac tamponade in contemporary practice remain relatively unknown.
Methods: Between October 2003 and June 2010, a total of 1509 consecutive patients were treated by PCI for a CTO defined as the presence of TIMI 0 flow within an occluded arterial segment of greater than 3 months standing. The population characteristics were compared regarding the presence of per and post-procedural tamponade.
Results: A cardiac tamponade occurred in 18/1509 patients (1.2%). As opposed to patients with a tamponade-free procedure, patients who have experienced cardiac tamponade were older (68.6±10.34 vs. 63.4±11.29, p=0.03) and had similar risk factors (diabetes in 27% and dyslipidemia in 64%). Cardiac tamponade occurred more frequently in experienced operators reflecting more complex procedures. Absence of visible stump was associated with higher rate of cardiac tamponade (50% vs. 24.8% for patients without tamponade, p=0.02). There were no differences regarding other angiographic characteristics between the two groups (calcifications, proximal tortuosities, lesion length). The use of a tornus device and a retrograde approach were associated with higher rates of cardiac tamponade (0.17vs 0.02 p=0.01, and 0.28vs 0.01 p=0.02, respectively). Procedural duration was longer in patients in whom a cardiac tamponade occurred (124±24 minutes, vs. 92±37 minutes, p=0.01) and success rate was equal (0.77 vs 0.70., p=0.61, respectively). Importantly, in-hospital stay was longer (7.2±3.6, vs. 3.1±3, p<0.0001, respectively), and rate of in-hospital death was higher among patients who have experienced cardiac tamponade compared to those without per and post-procedural tamponade (11% vs. 1%, p=0.01, respectively).
Conclusions: Cardiac tamponade occurred in 1.2% of a broad population of consecutive patients treated by PCI for chronic total coronary occlusion. Absence of visible stump and use of aggressive devices and strategies were more frequently associate.

TCT-377

Myocardial Performance Index After Successful Recanalization of Chronic Total Coronary Occlusions

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Background: Percutaneous recanalization of chronic total coronary occlusions (CTO) tends to show a positive effect on LV remodeling and ejection fraction (EF). Nevertheless, its effects on global cardiac functions are yet to be fully understood. Myocardial performance index (MPI) is likely to be more effective for analysis of global cardiac dysfunction than systolic and diastolic measures alone. The aim of this study was to evaluate the effects of recanalization of CTO on global cardiac functions by using MPI.
Methods: We evaluated 25 patients (20 men, mean age 57.5±14.1 years) who had ischemia on myocardial perfusion imaging and underwent successful percutaneous coronary intervention of right coronary artery (RCA) CTO. All patients underwent transthoracic echocardiography before (basal), 24 hours after (early) and at third months (late) of successful PCI. The MPI was calculated by using pulse wave tissue Doppler (TD) echocardiography.
Results: There was no difference between basal, early and late left ventricular ejection fraction values (53.5±10.2, 53.3±9.5, 53.3±11.2, respectively). The MPI at third month was significantly increased compared to the basal and early MPI (0.61±0.09 vs. 0.53±0.07; p <0.001 and 0.60±0.08 vs. 0.53±0.07; p<0.001, respectively). On the other hand, there was no significant difference between basal and early MPI (0.61±0.09 vs. 0.60±0.08; p=0.84, respectively). Also, TD MPI within 3 months was significantly increased when compared to others (0.58±0.9 vs. 0.53±0.8; p=0.003, 0.57±0.07 vs. 0.53±0.8; p<0.001, respectively for TD MPI septal and 0.59±0.08 vs. 0.51±0.07; p<0.001, 0.58±0.08 vs. 0.51±0.07; p<0.001, respectively for TD MPI lateral).

Table 1. MPI values before and after recanalization of RCA CTO

	Basal	Early	Late	P1	P2	P3
2d MPI	0.61±0.09	0.60±0.08	0.53±0.07	***0.84***	***<0.001***	***<0.001***
TD septal MPI	0.58±0.09	0.57±0.07	0.53±0.08	***0.33***	***0.003***	***<0.001***
TD lateral MPI	0.59±0.08	0.58±0.08	0.51±0.07	***0.42***	***<0.001***	***<0.001***

P1: basal vs. early MPI, P2: basal vs. late MPI, P3: early vs. late MPI, values are mean±std. deviation

Conclusions: In this study, we have shown that successful recanalization of CTO results in increased MPI-indicated global cardiac functions within 3 months, while the EF values remain unchanged.

TCT-378

Drug eluting stents with bioresorbable polymer – short and long term clinical outcomes in the treatment of CTO lesions

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Background: New generation drug eluting stents (DES) significantly improved short- and long-term vessel patency after CTO recanalization. Data on the performance of